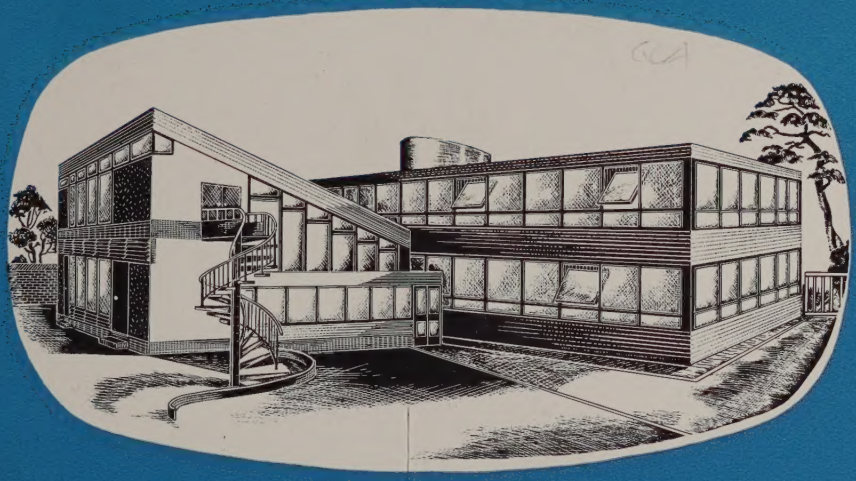


Jodrell Laboratory

Royal Botanic Gardens, Kew

1876-1965

The Jodrell Laboratory
1876-1965

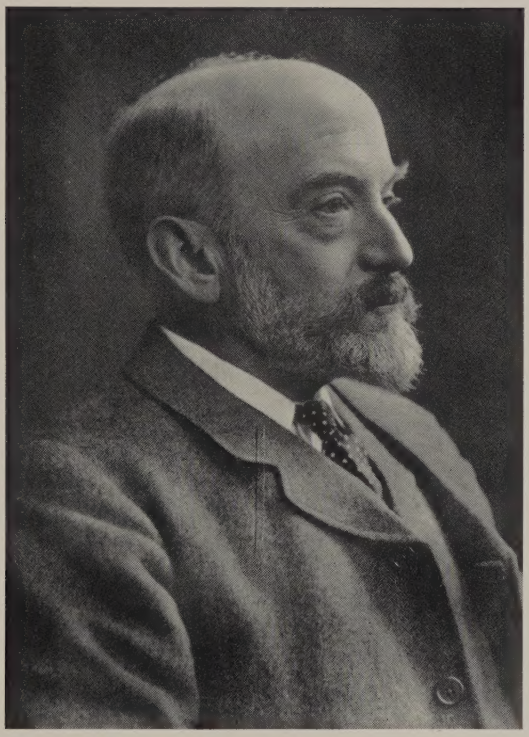
FOUNDATION AND SIGNIFICANCE OF THE LABORATORY

The first Jodrell Laboratory was opened in 1876. It was a private benefaction to Kew from Mr T. J. Phillips Jodrell, a personal friend of Sir Joseph Hooker who was then Director of Kew, and the original laboratory cost £1,000 to build and £500 to equip. Nevertheless, at the time when it was opened, the laboratory, modelled on the small research laboratories which were then fashionable in Germany, is said to have been as well furnished as any of them. Broadly speaking, the intention was that the laboratory should become a centre of research into the structure and physiology of plants. At that time the study of systematic botany was a well-established branch of plant science in the more advanced countries of the world. The botanical exploration of the countries which then constituted the British Empire had already provided, and was still serving as, a great stimulus to the study of plant classification in Great Britain. Kew had already witnessed the initiation, first of the Museums of Economic Botany and then of the Herbarium. But no provision had been made for the study of the structure and physiology of plants, and this country had lagged far behind the researches on these topics which had been in progress for some time in continental Europe, particularly in Germany and France. Few, if any, British botanists in those days contributed to the study of structural botany or to an understanding of plant physiology. Enterprising young botanists such as Frederic Orpen Bower and Dukinfield Henry Scott, seeing the danger in this lack of perspective in botanical knowledge, went to study under the eminent continental authorities Julius von Sachs of Würzburg and Anton de Bary of Strasbourg. Returning to England these young men were frustrated by the lack of facilities for following up the researches which they had undertaken and for developing the techniques they had learned on the Continent. It required the genius of Sir Joseph Hooker to see that investigations undertaken in laboratories and herbaria respectively are complementary and it was to meet this need that the Jodrell Laboratory was founded. In its early days there was a close link between the laboratory work at Kew and the expansion in the subject which was then taking place in the University of London. Some of the most notable men who helped to forge this link were William Turner Thiselton-Dyer, then Assistant Director and later Director of Kew, F. O. Bower and D. H. Scott. Besides having

a connection with Kew, all these men held or had held teaching appointments at London University. Indeed Thiselton-Dyer, who took charge of the Jodrell Laboratory in 1876, subsequently became so well known as Kew's Director that the important part that he played in the development of laboratory research tends to be overlooked. F. O. Bower never held office at Kew, but he conducted his early researches in the Jodrell Laboratory and maintained his interest in the progress of the work there until the end of his life. D. H. Scott was destined to play a very important part in the history of the laboratory for, apart from being a frequent visitor almost from the moment when it was first opened, he was made Honorary Keeper in 1892 and retained this appointment until 1906 when he voluntarily gave it up. During Scott's Keepership the laboratory became famous partly on account of Scott's own work, and partly through the researches of numerous distinguished men who were attracted to Kew by Scott's notable ability and charm of personality. It is a remarkable fact that of the botanists who worked at the Jodrell Laboratory in Scott's time no fewer than six became Fellows of the Royal Society and were also awarded Royal medals.

D. H. SCOTT APPOINTED HONORARY KEEPER

Scott's achievements in the sphere of botany are all the more remarkable when we consider his early career. Scott had taken a classics degree at Oxford, then turned to railway engineering and, having worked in the engine sheds at Euston station for a number of years, finally decided to make botanical research his career. In order to achieve this aim he devoted three months to learning sufficient German to enable him to follow a lecture, and then repaired to Sachs's famous laboratory at Würzburg where he was awarded the degree of Doctor of Philosophy for a thesis on laticiferous elements. On returning to England he became a teacher of botany at London University and played an important part in introducing German research methods into this country. Present-day botanists will probably find it still harder to believe that in 1892 Scott voluntarily relinquished the then high salary of £500 per annum to become Honorary Keeper of the Jodrell Laboratory. But perhaps most remarkable of all was that Scott's appointment was sanctioned only on the clear understanding that the post of Keeper should (i) be 'Honorary' and so remain and (ii) that it should cease to exist when vacated by Scott. Further evidence of Scott's scientific enthusiasm and generosity is afforded by the fact that he employed three assistants at his own expense. These were G. T. Gwilliam, W. C. Worsdell and L. A. Boodle, all of whom became distinguished botanists in their own right. L. A. Boodle, because of the veto on the continuation of the Keepership after Scott had given it up, was appointed Assistant in the Laboratory in 1906 starting with the princely salary of £80 per annum. From 1909 onwards he was styled Assistant Keeper and retained this status until he retired in 1930 on reaching the age limit. Boodle, a man of great personal charm, was so unassuming that his immense knowledge of plant anatomy was concealed from all but a few intimate friends.



Dukinfield Henry Scott, M.A., Ph.D., D.Sc., F.R.S., F.L.S.
Honorary Keeper of the Jodrell Laboratory 1892–1906

STRUCTURE AND EQUIPMENT OF THE ORIGINAL BUILDING

The old laboratory was indeed a modest building by modern standards for, in its original form, it was only some forty feet long and twenty feet wide. It consisted of two main rooms devoted to chemical and microscopical work respectively. There were also a smaller room for gas analysis and another in which instruments and books were kept and discussions were held. A bay was thrown out from the chemical room to facilitate spectroscopic work which was then much in vogue. There were also a small greenhouse and a store room attached to the laboratory. Although the uses to which the various rooms were put have changed during the history of the building, the laboratory remained unaltered in all essentials until 1934, when an artist's studio, a photographic darkroom, an attendant's room and a larger greenhouse were added. The original scientific equipment provided by Mr Jodrell was of first-rate quality at the time when it was purchased, mostly from continental sources. The advice of various well-known people was sought in selecting this equipment, and there is at Kew a

letter from Charles Darwin advocating that only the best possible apparatus should be purchased. It is a remarkable fact that much of Mr Jodrell's original equipment continued in use until after 1930. It is also worthy of record that even now we still have some of the original microscopical stains obtained from Dr Grübler of Leipzig, and some at least of them do not appear to have deteriorated. Another of our museum pieces is a Cambridge Rocking Microtome,

JODRELL LABORATORY 1958
Erected 1876, extended 1934, demolished 1963

now painted bright red, which is believed to have been one of the first to be used in the country for botanical purposes. It is still in perfect working order.

SOME NOTABLE RESEARCH WORKERS

The very first notable research worker who made use of the laboratory was John Tyndall, D.C.L., LL.D., F.R.S., who was interested in putrefaction. An account of this work was published in the *Philosophical Transactions of the Royal Society*, vol. 167, 1877, under the very ponderous title 'Further Researches on the Deportment and Vital Persistence of Putrefactive and Infective Organisms from a Physical point of View'. The work was undertaken at Kew in the expectation that the air there would be purer than in the centre of London

and so we read in Tyndall's paper: 'I resolved therefore to break away wholly from the Royal Institution, and, thanks to the friendly permission of the President of the Royal Society, I was able to transfer my apparatus to Kew Gardens. By the enlightened munificence of Mr Jodrell, a new and very complete laboratory had been just erected there, and in it I sought a purer air than I could find at home'.

The outstanding classical researches by C. F. Cross and E. J. Bevan on the chemistry of lignification are very well known, especially as this work laid the foundation for the 'rayon' or 'artificial silk' industry. It is a highlight in the history of the laboratory, probably unknown to most scientists to-day, that the very early stages of Cross and Bevan's investigations were undertaken at the Jodrell Laboratory. Another classical investigation, undertaken by H. T. Brown, F.R.S. and F. Escombe, related to the diffusion of gases through membranes perforated by fine holes to represent stomata. This likewise took place in the Jodrell Laboratory and led to a much more complete understanding of the mechanism by which gases are exchanged between plants and their environment.

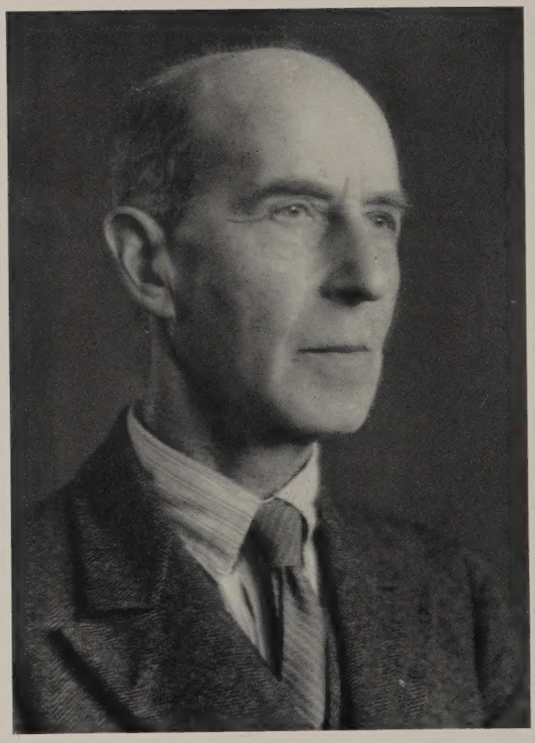
Important as it was, other early work at the laboratory can only be mentioned briefly. This included D. H. Scott's outstanding work on Coal Measure plants, some of which was undertaken on his own, and some in collaboration with close friends such as Professor W. C. Williamson of Manchester. Then we have Bower's early work on Pteridophytes. W. C. Worsdell was, when a young man, employed by D. H. Scott as a personal assistant. Worsdell will be best remembered for his two volumes on *Vegetable Teratology*. G. E. Massee, in his day a leading authority on fungi and plant diseases, undertook much of his work on plant pathology at the Jodrell Laboratory. In due time this work expanded so greatly that other laboratories had to be built to provide the necessary accommodation. It is a matter of historical interest that there is a direct connection between Massee's work at the Jodrell Laboratory and that which is at present undertaken at the Commonwealth Mycological Institute and at the Ministry of Agriculture's Laboratory of Pathology at Harpenden, both of which departments are 'descendants' from the old Jodrell Laboratory.

After Scott left Kew in 1906, L. A. Boodle, working almost single-handed, used his knowledge of plant anatomy to solve many difficult practical problems that were submitted to Kew. These activities were the starting point for the very much greater number of anatomical routine investigations that are undertaken at the laboratory to-day. Boodle became one of the world's leading authorities on the identification of archaeological material, especially from the tombs of Ancient Egypt.

These are but a few of the many and varied lines of investigation that were pursued in the old laboratory.

THE MODERN ERA IN THE HISTORY OF THE LABORATORY

The present era may be regarded as having started after Boodle's retirement in 1930. Since then the tradition for anatomical research, so firmly established



Leonard Alfred Boodle, A.R.C.S., F.L.S.
Assistant 1906–9, Assistant Keeper of the Jodrell Laboratory 1909–30

by Scott and ably continued by Boodle, has been carried a stage further. For example a two-volume reference work entitled *Anatomy of the Dicotyledons*, written by the present Keeper in collaboration with Dr L. Chalk of the Commonwealth Forestry Institute at Oxford, was published in 1950. This work superseded Hans Solereder's *Systematic Anatomy of the Dicotyledons* which, in 1908, had been translated into English by Boodle and Fritsch and revised by Scott. *Anatomy of the Dicotyledons*, already reprinted once and about to be reprinted again, has since been followed by the first two of four volumes entitled *Anatomy of the Monocotyledons*. The work is still being pursued under the Keeper's direction with the collaboration of younger botanists. The knowledge gained through these researches is put to practical use every day in identifying a great and ever-increasing number of miscellaneous botanical specimens which can be recognised only by their microscopical structure. This is a good example to show how fundamental research provides data which can be used to solve everyday problems, some of which are of considerable economic importance. Both the research and routine work at present in progress would be impossible without the refer-

ence collection of some 35,000 microscope slides which has been built up since 1930, a collection which is just as important to the systematic anatomist as dried specimens are to his herbarium colleagues. The slide collection continues to grow steadily.

During the past four or five years our activities have been extended to cover the very important field of cytology in relation to plant classification, a subject to which very little attention could be devoted at Kew until our staff had been increased and improved laboratory facilities were available. A good start has now been made in this field and there is every promise that rewarding results will be obtained by the very active team engaged in this work.

Although it was originally planned that the study of plant physiology should form an integral part of the work to be undertaken at the old laboratory, this hope has scarcely been fulfilled in recent years, though some attention has been given to the effects of air pollution on the plants grown at Kew and to the use of chemicals in propagation. So many species of plants are cultivated at Kew that there is very great scope for investigating problems that can be tackled more readily here than elsewhere and provision has been made for a physiological department in the new laboratory.

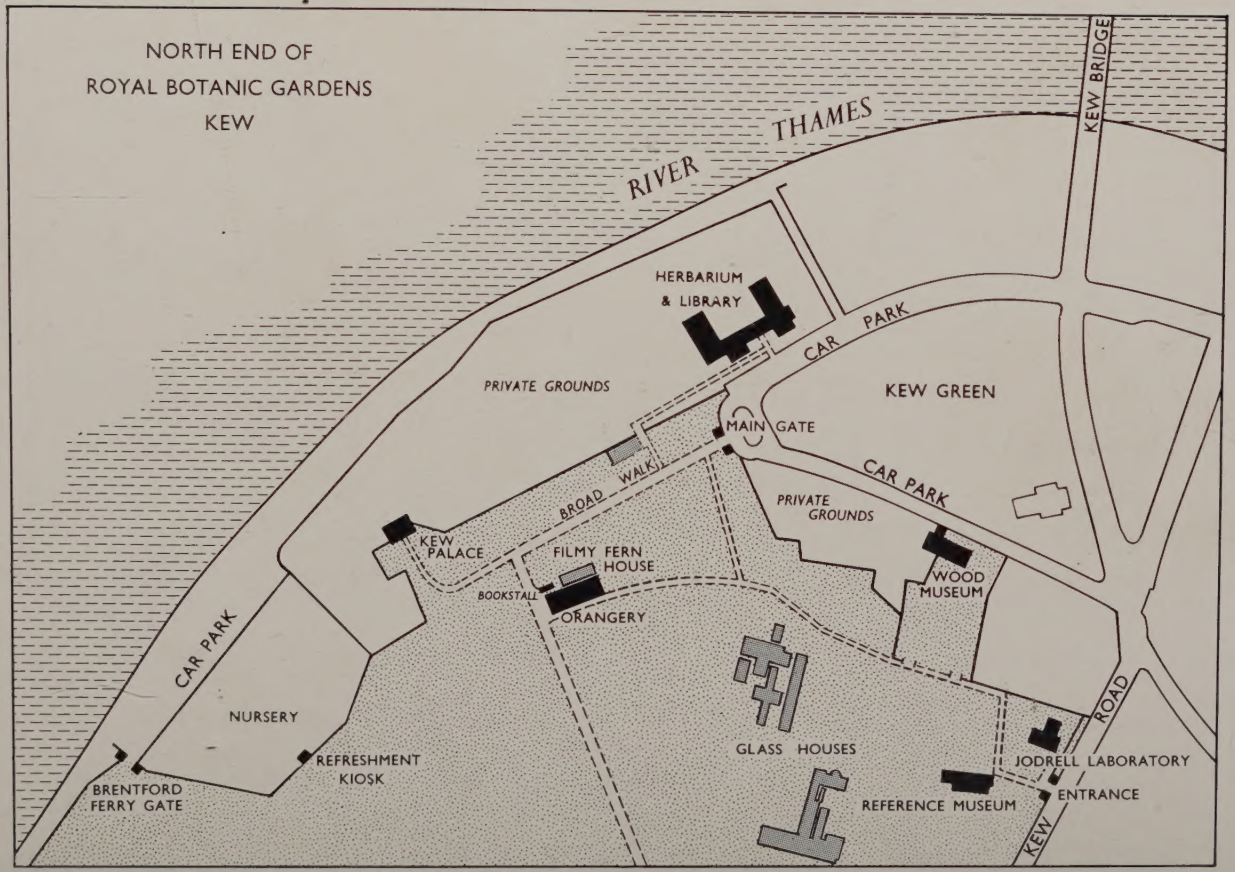
NEW JODRELL LABORATORY
Erected 1964

The fact that so much was achieved in the old laboratory affords ample evidence of the wisdom of those who founded it. It is also a tribute to all who worked within its walls that their enthusiasm and capacity for hard work enabled them to rise above the difficulties imposed upon them by what to us seems a small building and by the simplicity of their tools. Nevertheless, conditions have changed so much that it is no longer possible to meet the demands of the present age without more space, better lighting and better and more modern equipment. A laboratory that fails to adapt itself to change is just as likely to perish as a living organism that is out of balance with its environment.

Thus the new laboratory has been built to keep Kew in the forefront of botanical research and allow experimental botanists to use the unrivalled living collections of the Royal Botanic Gardens.

Printed for Her Majesty's Stationery Office
by W. S. Cowell Ltd, Ipswich

Wt 50416/Dd 113. 1m. 4/65. Gp 469/4


NORTH END OF
ROYAL BOTANIC GARDENS
KEW
RIVER THAMES
KEW BRIDGE
HERBARIUM
& LIBRARY
CAR PARK
PRIVATE GROUNDS
KEW GREEN
MAIN GATE
CAR PARK
BROAD WALK
PRIVATE GROUNDS
KEW PALACE
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ENTRANCE
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